

CLAIMS

1. A self-locking clip adapted for vascular tissue connection, comprising:

a body;

a sharp extension on one side of the body adapted to pierce blood vessel tissue; and

a base on another side of said body, said base adapted to interlock with said extension,
at least to prevent retraction of said extension from said base after inserted,

wherein said clip is pre-disposed to assume a closed configuration where said base
locks to said extension.

2. A clip according to claim 1, wherein said extension defines a plurality of locking
positions.

3. A clip according to claim 1, wherein said base defines an aperture adapted to receive
said extension.

4. A clip according to claim 3, wherein said aperture is adapted to guide said extension to
be locked.

5. A clip according to claim 1, wherein said clip is adapted to be used as part of a set of a
plurality of clips to complete single anastomosis connection.

6. A clip delivery system, comprising:

a plurality of clips adapted for vascular tissue connection, each clip comprising:

a body;

a sharp extension on either end of said body,

wherein said clip is pre-disposed to form a "C" shape;

an inner tube defining a plurality of slots; and

an outer tube axially movable with respect to said inner tube,

wherein said inner and outer tube define a receptacle for said clip, said clip being
released when said outer tube is retracted relative to said inner tube and wherein said inner
tube defines a slot adjacent said receptacle, said slot adapted to receive a bent-back section of a
backwards pointing one of said extensions.

7. A delivery system according to claim 6, wherein said body defines an aperture and wherein said inner tube defines a matching protrusion to said aperture and wherein said body curves when released, such that said aperture is released from said protrusion.

5

8. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body;

a designated tear location structurally defined at a location along said body;

10

a hooked tip adapted to pierce a blood vessel; and

a base element adapted to lock to said hooked element,

wherein said hooked element is adapted to not tear vascular tissue.

15

9. A clip according to claim 8, wherein said hooked tip is adapted to not cut vascular tissue.

10. A clip according to claim 8, wherein said hooked tip has the shape of a needle.

20

11. A clip according to claim 8, wherein said hooked tip is manufactured by cutting and smoothing a planar material.

12. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body;

25

a designated tear location structurally defined at a location along said body;

a designated locking location structurally defined at a location along said body;

a hooked tip adapted to pierce a blood vessel; and

a base element adapted to lock to said hooked element at said locking location,

wherein said designated tearing location is configured to enhance a locking at said

30 locking location.

13. A clip according to claim 12, wherein said tearing location is configured so that tearing causes the bending of at least one part of said hooked element to narrow a passage of a portion of said base element within said hooked element.

5 14. A clip according to claim 12, wherein said tearing location is configured so that tearing causes the bending of at least one part of said hooked element to widen a portion of said hooked element which travels within said base element.

10 15. A clip according to claim 12, wherein said tip is adapted to pierce vascular tissue without causing tearing.

16. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body having a slot defined therein;

15 a designated tear location structurally defined at a location along said body;

a designated locking location structurally defined at a location along said body;

a hooked tip adapted to pierce a blood vessel; and

a base element adapted to lock to said hooked element at said locking location and including a section that fits in said slot,

20 wherein said designated locking location is located in said slot.

17. A clip according to claim 16, wherein said hooked element comprises a second designated locking location on an outside of said hooked element.

25 18. A clip according to claim 16, wherein said tip is adapted to pierce vascular tissue without causing tearing.

19. A clip according to claim 16, wherein said base element is planar.

30 20. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body;

a designated tear location structurally defined at a location along said body;

a designated locking location structurally defined at a location along said body;

a hooked tip adapted to pierce a blood vessel; and

a base element adapted to lock to said hooked element at said locking location,

wherein said designated locking location is defined by at least one active portion on

5 said hooked element which engages a portion of said base section.

21. A connector according to claim 20, wherein said base element includes no portions that
move relative to a center of gravity of said base element during a locking activity.

10 22. A connector according to claim 20, wherein said base element is planar.

23. A clip according to claim 20, wherein said tip is adapted to pierce vascular tissue
without causing tearing.

15 24. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body;

a designated tear location structurally defined at a location along said body;

a designated locking location structurally defined at a location along said body;

20 a hooked tip adapted to pierce a blood vessel; and

a base element defining a second locking location adapted to lock to said hooked
element, wherein both said base element and hooked element each include at least one portion
that moves during locking.

25 25. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:

an elongate body having an axis;

a designated locking location structurally defined at a location along said body;

a hooked tip adapted to pierce a blood vessel; and

30 a base element having an aperture adapted to ride on said body, said base element
adapted to lock to said hooked element at said designated locking location,

wherein said locking location comprises at least one widening on said hooked element perpendicular to said axis and at least one aperture formed in said body adjacent said widening.

- 5 26. A connector clip adapted for vascular tissue connection, comprising:
a hooked element comprising:
an elongate body having an axis;
a hooked tip adapted to pierce a blood vessel; and
a base element having an aperture adapted to ride on said body and wherein at least one
10 section of said base element contacting said aperture is adapted to be elastically moved to
widen said aperture and comprising:
at least one holder adapted to widen said aperture when pulled against a
resistance of said hooked element in said aperture.
- 15 27. A connector according to claim 26, wherein said holder comprises an apertured holder.
28. A connector according to claim 27, wherein said aperture contains a thread.
29. A connector according to claim 26, wherein said holder is adapted to be torn off said
20 base element.
30. A method of mounting a base element of an anastomotic clip on a hooked element of
an anastomotic clip, comprising:
placing said hooked element in an aperture of said base element; and
25 pulling on a holder section of said base element to widen said aperture.
31. A method of demounting a base element of an anastomotic clip on a hooked element of
an anastomotic clip, comprising:
pulling on a holder section of said base element to widen an aperture of said base
30 element on which said hooked element is mounted; and
removing said base element.

32. A connector clip set adapted for performing a vascular anastomotic connection, comprising:

a plurality of connector clips, each comprising:

a hooked element comprising:

an elongate body having an axis, a first end and a second end;

a pulling point adapted to have a pulling force applied to at said first end

a hooked tip adapted to pierce a blood vessel at said second end

a resting point for a base element between said ends; and

a base element adapted to ride on said body and stop at said resting point,

wherein a distance between said resting point and said pulling point is different for different ones of said clips.

33. A connector according to claim 32, wherein said resting point is adapted to withstand a force of at least 1 Kg applied from said pulling point.

34. A pulling connector adapted for vascular tissue connection, comprising:

a ring; and

a plurality of hooked elements, extending from the ring, having an elongate body curved into said ring,

wherein said elongate elements are pre-disposed to retract such that they pull vascular tissue towards said ring to complete an anastomotic connection.

35. A connector according to claim 34, wherein said hooked elements rotate when released.

36. A connector according to claim 34, wherein said curves flatten when released.

37. A connector according to claim 34, wherein said hooked elements are adapted to pierce blood vessel tissue without tearing.

38. A connector according to claim 34, wherein said ring defines a plurality of recesses for said hooked elements.

39. A connector according to claim 34, wherein said ring is substantially rigid.

40. A method of deploying a tearing vascular anastomotic connector having multiple tearing points, comprising:

- 5 tearing a first leg to complete a first part of an anastomosis; and
 tearing a second leg after said first tearing to complete a second part of said anastomosis.

41. A method according to claim 40, comprising applying a continuous force to said
10 connector during said first and second tearing and in between.